I found the temperature (the thermometer lying in the cavity for over ten minutes) 26° 95 C. (about 80° F.) To be quite sure, and to prevent any mistakes, I introduced again the thermometer into the abdominal cavity in half-an-hour's time, and let it remain there for over fifteen minutes.

The very sensitive thermometer (made for observation of temperature of the human body on the sickbed) showed again the temperature of 26° 65 C. (about 79° F.) Wishing to be quite sure about the observations, I induced Mr. R. T. Steiger, the Government Analytical Chemist in Brisbane, to place his thermometer in the cavity, and we obtained there with this other thermometer a temperature of 78° F., (or 25° 5 C.), which result agreed very nearly with the previous observations.

Taking the average of these three observations, we find the mean temperature of the body of the *Echidna hystrix* to be about 28° C. (or, 82° 4 F.)

Comparing the same with the mean temperature of Mammalia, which is, after Dr. J. Davy's observations of thirty-one different species, 38° 4 C., or 101° 10 F., we find that the mean temperature of the Echidna is about 10° C., or 19° F., lower than the former.

I have to add that in the month of July the Echidnas appeared to be in a very sleepy state, moving about in the day time only when disturbed. It is possible that during the winter months the Echidna is subject to a state of hibernation, which may also to a certain extent depress the usual temperature of the body.

Plagiostomata of the Pacific.

By N. de Miklouho Maclay and William Macleay. Part 2.

Plate xx.

It is now exactly five years since we read a Paper with the above heading at a meeting of this Society, and which was published in the third volume of our Proceedings.

At that time we contemplated, as indeed the title of our Paper indicated, a succession of Papers descriptive and illustrative of all the Plagiostomatous Fishes, known to inhabit the Pacific Ocean. A lengthened absence from the country on the part of one of us, has prevented the fulfilment of our intentions with the regularity which we contemplated. We now resume our task, but only at present to deal with what may be regarded as matter supplementary to our first Paper.

A few weeks ago the Australian Museum received among a collection of Fishes from Japan, a specimen of the *Heterodontus* of those seas, a fish which from its first discovery has been accepted by naturalists almost without exception as identical with *H. Phillippi*—the Port Jackson Shark. We were led to suspect when writing our former Paper, that the Japanese species was distinct, and that possibly the same might be the case with the species found by Dr. Bleeker in the East Indian Archipelago, and we stated some reasons for our belief (Proc. Lin. Soc., N. S. W., Vol. 3, p. 313), but authors were evidently puzzled on the subject, and the confusion had become so universal, that until now, when we have the fish actually before us, we were unable to pronounce with any certainty as to the distinctness of the species. We have no longer any doubt on the subject, the species, though somewhat resembling *H. Phillippi*, is most distinct in its marking, which in *H. Phillippi* is very constant, in its dentition and various other less important particulars. To give some idea of the confusion that exists among authors respecting the Fishes of this genus we may mention that the figure (a very bad one) of *Cestracion Phillippi* in the "Voy. of the Coquille, Pl. 2," is not the Port Jackson fish, that Muller and Henle's figure (Plate 31), is most likely the Japanese species, the number of vertical bands being identical, that the tooth given in the same plate as that of *Phillippi* is certainly not of either species, and that Schlegel in the Fauna Japonica describes the Japanese fish as *Cestracion Phillippi*. It is very probable that the *Cestracion Zebra* of Gray and Richardson, and *Heterodontus Zebra* of other authors, were properly described as distinct species, and were really the

Japanese fish, but as these names have been long looked upon only as synonyms, and as we have not access to the books in which they were originally described, we have deemed it best to remove all future doubts, by giving the present species the distinctive name of *Japonicus*.

HETERODONTUS JAPONICUS. Mcl.

In form much resembling *H. Phillippi*. Supraorbital ridges, strong, with large dark scutella, and a little emarginate over the eye, terminating a little behind the eye and continued in front towards the snout, leaving a large flat depressed space between the ridges.

The snout is very bluntly rounded. The mouth differs from that of *H. Phillippi* in having the inner nasal fold less long, the fold of the upper lip rounder and shorter, and the inferior margin of the fold of the lower lip covered with soft skin with only very few scutella.

The teeth are in 23 vertical rows in both jaws, the 7 middle rows of the upper jaw consist of 5 cuspid teeth, of which the three middle cusps are largest, but all well marked and distinct. The number of teeth in the central row is 8. The lateral cuspid teeth in rows 7, 8, 16 and 17 (Pl. 20, fig. 4) are more elongate, and the middle cusps are less distinct than in the teeth of the more central rows; in rows 6 and 18 the united cusps take the form of a longitudinal crest, which corresponds with the longitudinal line on the large pavement like lateral teeth (rows 1-5 and 19-23).

In the upper jaw there are in most cases 5 teeth in each of the vertical rows of pavement like teeth. Rows 3 and 21 show the largest teeth in the upper jaw, whilst in the lower, rows 4 to 20 show the largest. The number of the rows of the pavement like teeth are different in the two jaws, there being 10 rows (5 on each side) in the upper, and 12 rows (6 on each side) in the lower jaw.

All the teeth of the middle rows of the lower jaw are alike in shape, those of the upper jaw (rows 8 and 17) vary considerably, the lateral teeth being different from those of the central rows.

We may repeat, however, what we noticed in our description of *H. Phillippi* in our former Paper that the teeth vary much in form, size, and numbers, according to the age and size, and perhaps sex of the individual.

The spiracles are distinct, larger than in *H. Phillippi*, and placed a little under the eye, and in a vertical line distinctly behind the eye. The lateral line is straight and continuous from the supra-orbital ridges. The first dorsal fin is high and falciform, the height is exactly twice the length of the portion of the base attached to the back, the spine is slight and acute and half the length of the fin. The second dorsal is shaped like, but less in height than, the first, and its base of attachment to the back is about the same; the distance between the two dorsals is equal to that between the second dorsal and the commencement of the caudal fin, and to that between the first dorsal and the eye. The pectorals are large and triangular, and about equal in length to the caudal. The ventrals are situated in a line intermediate between the two dorsals, the anal commences distinctly behind the second dorsal, and does not nearly reach the caudal. The lower lobe of the caudal is very deeply and less than rectangularly notched.

The coloration and markings are not by any means distinct, the specimen having evidently been long in spirits, but the remains of numerous dark brown bars across the back present a very different style of marking from the other known species of the genus. The best description of this Fish is to be found in Perry's United States Exped. to Japan (Vol. 2 p. 285 Pl. 13 fig. 2), in which Brevoort describes a young specimen of 8 inches in length. We quote his description, because it is probably the only instance of a description taken of this species from a fresh specimen. It must be noted however, that it was little more than an embryo. "Its general colour is of a pale sepia-like brown, darker on the back and fins, with a pinkish tinge on lower parts of the body. Irregular bands and large blotches of several shades of the same brown are distributed from the pectorals to the caudal, grouped in five principal bands with smaller ones near the back, between the first three large ones; the first of these is just back of

the pectorals, the second back of the first dorsal, and in front of the ventrals, spreading laterally near the abdomen. The snout and cheeks are shaded also with darker brown cloudings. Small pale brown dots besides the above cover the back of the head and body; and about one-half of the pectorals, dorsals, and caudal ventrals, anal and lower lobe of dorsal of a more uniform brown.

"Sa-siwari" of the Japanese, common in Spring and Autumn, and much sought after for food."

The specimen which we have now figured and described, is a female of 16 inch in length, or about half grown. In marking as we have previously observed it is distinct from all its congeners, in general aspect it much resembles *H. Phillippi*, the species with which it has always been confounded, but in its dentition it comes nearest to *H. Francisi*, differing however from it considerably in the 5 cuspid middle teeth.

The number of known species of *Heterodontus* now amounts to five, distributed as follows :—

North Pacific Ocean, East or American side, *Heterodontus Francisi*, San Francisco. West side, China and Japan, *Heterodontus Japonicus*, Japan. South Pacific Ocean, West or Australian side, *H. Phillippi* and *galeatus*, Sydney. East or American side, *H. Quoyi*, Galapagos Islands.

Dr. Bleeker seems to have found a species in the Indian Ocean, which he at once set down as *H. Phillippi*. It is not at all improbable however, that it may be distinct, or that it is identical with the Japanese Fish; indeed it is most unlikely to be *H. Phillippi*, a species which seems to have only a limited range in a direction N. of Sydney, not being known on the Queensland Coast, while it extends to the South as far at least as the mouth of the Derwent in Tasmania.

We may note here that *H. galeatus* Gunth. regarded when we last wrote as so rare, has been got frequently of late years, its rarity arising probably more from the ignorance and want of observation on the part of the fishermen, than the actual paucity of its numbers. Echini form the chief food of this species and probably of all the genus, the strong dorsal spines and prominent supraorbital ridges

enabling them to force their way under rocks and stones in pursuit of these animals. A fine specimen of *H. galeatus* in the Macleay Museum—a strong young female adult, had the dorsal spines worn down to half their proper length, evidently in this way, and its viscera were full of finely triturated Echinus tests indicating pretty clearly how the grinding of the dorsal spines had been effected.

Explanation of Plate 20.

Heterodontus Japonicus. Mcl.

Fig. 1.—Profile view of a spirit specimen of H. Japonicus in the Australian Museum, Sydney; $\frac{2}{3}$ of nat. size, the specimen being about 19 inches long.

Fig. 2.—View of the same animal from above, also $\frac{2}{3}$ of nat. size.

Fig. 3.—Anterior part of the head from the ventral side, to show the arrangements of the nasal groove, the labial folds and the anterior teeth.

Fig. 4.—Diagrammatic sketch of the teeth of the upper (Fig. 4, a.) and the lower (Fig. 4, b.) jaws of H. Japonicus about 4 times the nat. size. The cyphers indicate the vertical rows of teeth to illustrate the references in the test.

(The jaws not having been taken out, the drawing of the teeth has been rather difficult, so that only a *diagrammatic* sketch could be obtained. The spaces beneath the front teeth are represented a little larger on the sketch than in nature, but it is done on purpose to show more distinctly the cusps of the teeth.)

Fig. 5.—One of the front 5 cuspid teeth of the middle row, enlarged about 5 times.

Lettering Followed throughout all the Figures.

a.—Superior oral fold.

b.—Inferior oral fold.

n.—External orifice of the nasal groove.

sp.—Spiracle.